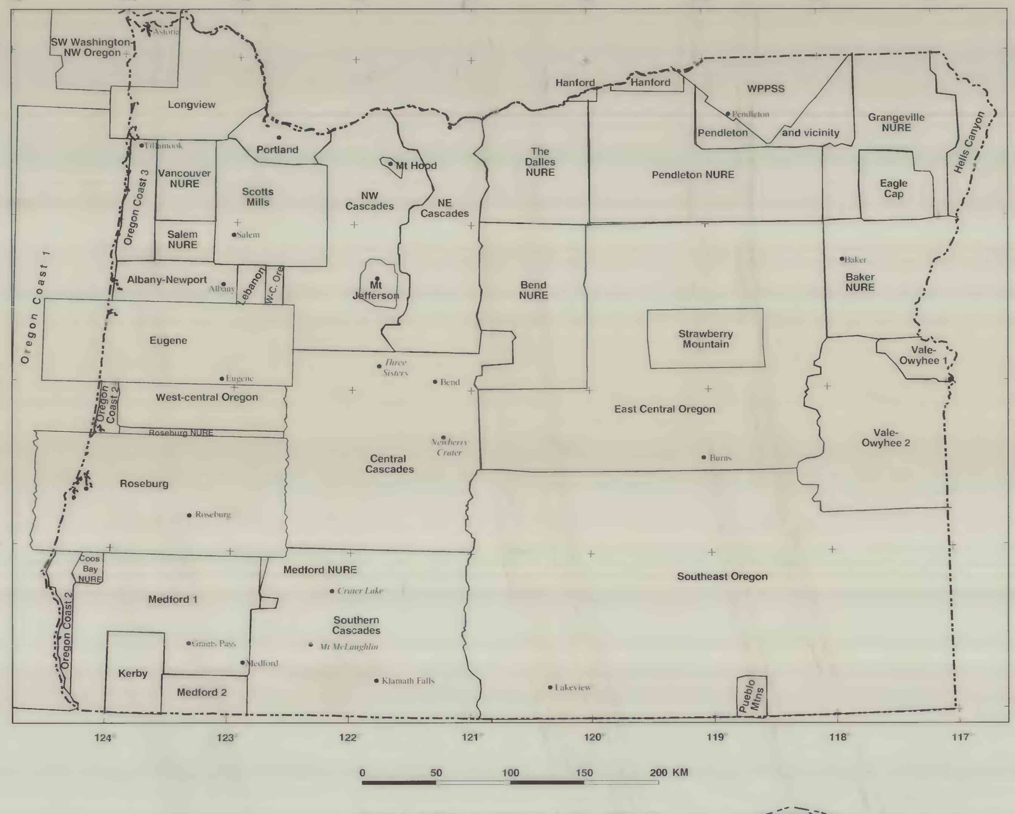
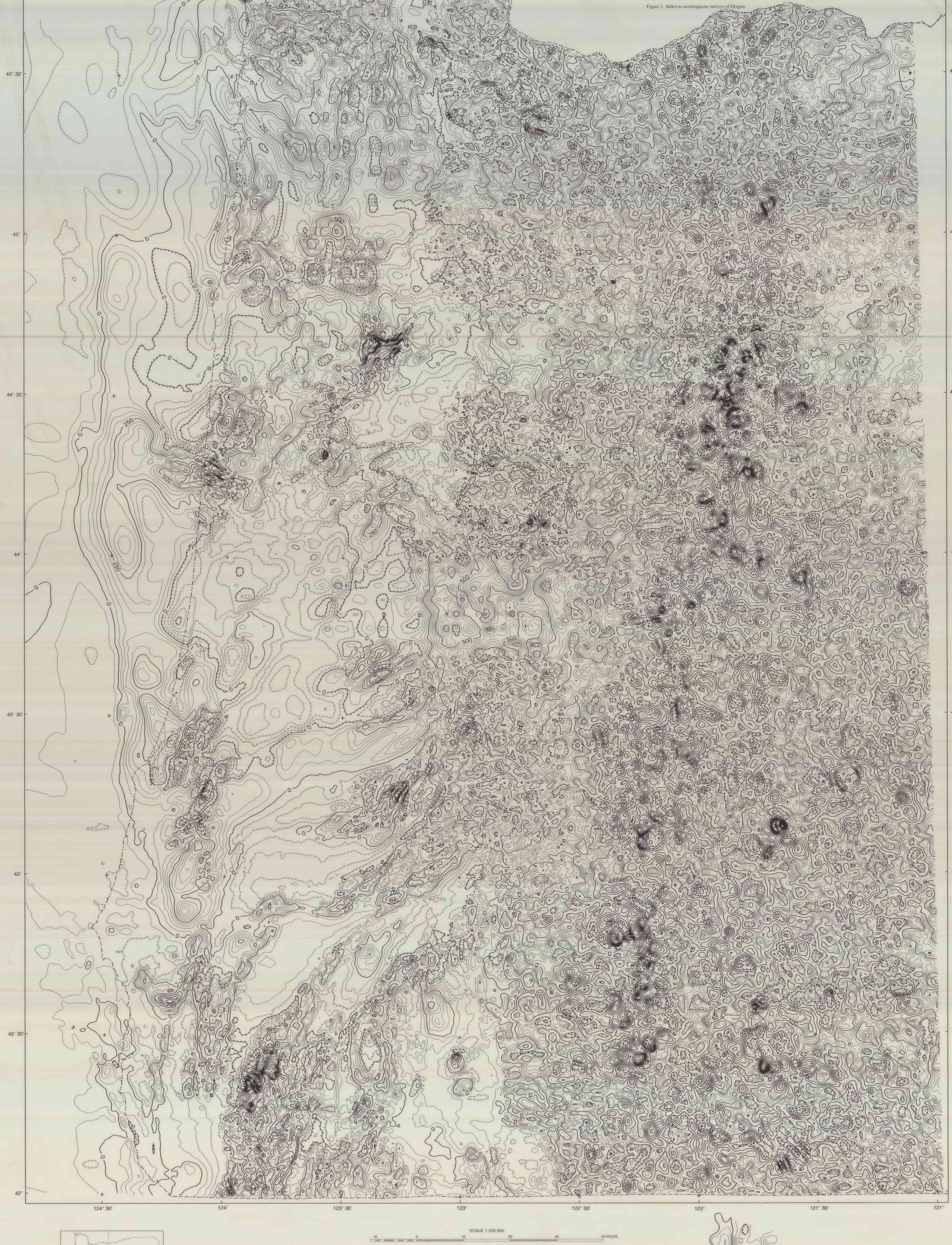


Figure 1. Index to aeromagnetic surveys of Oregon



A digital synthesis of various aeromagnetic surveys was compiled to simulate, as best possible, a single survey flown at 305 m above terrain. This makes possible geologic interpretation over wide regions across survey boundaries. Surveys flown at a constant distance above ground and along closely spaced flightlines inherently show more detail than surveys flown far above ground level. Caution should thus be used when interpreting features seen at survey boundaries.

Aeromagnetic data (figure 1, table 1) were obtained from more than 40 surveys collected at different times, elevations, orientations, and flight-line spacings. Most recent surveys were flown at a nominal 305 m above terrain and could be used with little processing. Older surveys often were flown at a constant barometric elevation and hence much of each survey was flown far above ground level. Many older surveys existed only in non-digital form. These were manually digitized to facilitate computer processing.

To produce a coherent magnetic database, the following procedures were applied to the individual surveys:

(1) The International Geomagnetic Reference Field (IGRF), updated to the date that the survey was flown, was removed from each survey to generate a temporally consistent set of residual magnetic data. This subtraction had already been applied to most individual surveys. On some early surveys it was unclear whether a regional field had been removed from the published data. In such cases, we removed the IGRF only if it provided a better fit with surrounding data sets.

(2) All surveys were then gridded with a 500-m spacing, Lambert Conformal projection, central meridian of 123,then placed on a common geographic datum located 305 m above the ground surface. Surveys not collected at this height were mathematically modified to approximate the magnetic field that would have been measured at a height of 305 m above the ground surface (Cordell 1985).

(3) The individual surveys were compared in areas of overlap, datum shifted as necessary to give the best fit, and finally merged into a single grid. In areas where two of more surveys overlapped, the best available survey was used, and that was typically the one with the lowest flight height and closest line spacing.

Almost the entire state was flown for the Department of Energy National Uranium Resource Evaluation (NURE) program (U.S. Dept. of Energy, 1978, 1981a-f). These surveys were typically flown about 120 m above ground with a flight-line spacing of 5 or 10 km. These surveys were used in areas where no other data were available or other data were of lower quality and resolution. Gridding such data at a fine interval can cause artifacts to appear along flightlines. Generally a somewhat larger grid spacing was used initially then that grid was regridded finer to minimize this problem.

The magnetic declination ranges between 14° east at the southeastern corner of the state to 19° east at the northwestern corner.

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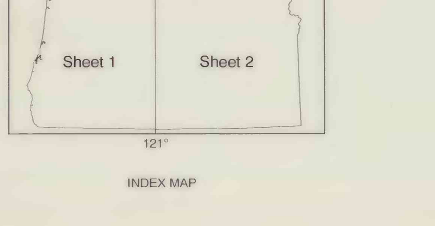
Table 1. Oregon aeromagnetic surveys

Area	Year flown	Altitude*	Line spacing	Reference
Albany-Newport	1954	305 m AG	0.8 km	Bromery (1965)
Baker NURE	1977	120 m AG	5 km	U.S. Dept. of Energy (1978)
Bend NURE	1980	120 m AG	5 km	U.S. Dept. of Energy (1981b)
Central Cascades	1977	2740 & 3350 m baro	1.6 km	Couch and others (1978)
Coos Bay NURE	1980	120 m AG	10 km	U.S. Dept. of Energy (1981a)
Eagle Cap	1970	3050 m baro	1.6 km	Davis (1976)
East Central Oregon	1983	2290 m baro	5 km	USGS (1984a)
Eugene	1997	305 m AG	0.8 km	USGS (not yet published)
Grangeville NURE	1980	120 m AG	10 km	U.S. Dept. of Energy (1981f)
Hanford	1957	150 m AG		Swanson and others (1979)
Hells Canyon	1974	2750 m baro	1.6 km	USGS (1980)
Kerby	1950	1370 m baro	0.8 km	Balsey and others (1960)
Lebanon	1954	200 m AG	0.8 km	Bromery (1962)
Longview	1995	305 m AG	0.4-0.8 km	Finn (1996)
Medford 1	1978	1370 m baro	1.6 km	USGS (1979)
Medford 2	1978	1980 m baro	1.6 km	USGS (1979)
Medford NURE	1980	120 m AG	5 km	U.S. Dept. of Energy (1981c)
Mt Hood	1977	4270 m baro	1.6 km	Couch and others (1985)
Mt Jefferson	1981	1980 & 3700 m baro	1.0 km	USGS (1982b)
NE Cascades	1982	1520 m baro	1.6 km	Couch and others (1985)
NW Cascades	1982	2130 m baro	1.6 km	Couch and others (1985)
Oregon Coast 1	1968	150 m baro	1.6-10 km	USGS (1970)
Oregon Coast 2	1968	1070 m baro	1.6-3.2 km	USGS (1970)
Oregon Coast 3	1968	1070 m baro	10 km	USGS (1970)
Pendleton and vicinity	1976	150 m AG	0.8 km	USGS (1979b)
Pendleton NURE	1980	120 m AG	10 km	U.S. Dept. of Energy (1981e)
Portland	1993	305m AG	0.5 km	Snyder and others (1993)
Pueblo Mtns	1985	305 m AG	0.8 km	USGS (1984c)
Roseburg	1996	305 m AG	0.8 km	USGS (1996)
Roseburg NURE	1980	120 m AG	10 km	U.S. Dept. of Energy (1981d)
Salem NURE	1980	120 m AG	10 km	U.S. Dept. of Energy (1981b)
Scotts Mills	1995	305 m AG	0.5 km	USGS (1996)
Southeast Oregon	1972	2740 m baro	3.2 km	USGS (1972)
Southern Cascades	1980	2740 m baro	1.6 km	Couch and others (1981)
Strawberry Mountain	1975	2740 m baro	1.6 km	USGS (1978)
SW Washington-NW Oregon	1976	910 m baro	3.2 km	USGS (1984b)
The Dalles NURE	1980	120 m AG	10 km	U.S. Dept. of Energy (1981e)
Vale-Owyhee 1	1976-7	1520 m baro	1.6 km	Couch (1978)
Vale-Owyhee 2	1976-7	2130 m baro	1.6 km	Couch (1978)
Vancouver NURE	1980	120 m AG	10 km	U.S. Dept. of Energy (1981e)
West-Central Oregon	1983	1820 m baro	5 km	USGS (1984d)
WPPSS	1977	610-915m AG	0.8 km	written commun. Lisle Exploration Inc (Denver, CO)

* AG = height above ground, baro = constant barometric altitude



INDEX MAP

SCALE 1:500 000
10 0 10 20 30 40 MILES
10 0 10 20 30 40 50 KILOMETERS

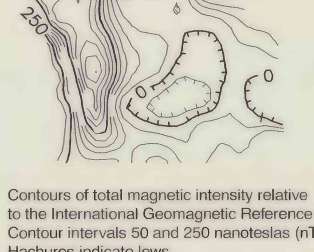
PRELIMINARY MERGED AEROMAGNETIC MAP OF OREGON

By

Carter W. Roberts, Richard J. Blakely, and Carol Finn

1997

Sheet 1, Western Oregon



Contours of total magnetic intensity relative to the International Geomagnetic Reference Field. Contour intervals 50 and 250 nanoteslas (nT). Hachures indicate lows.